

*Sturnira aratathomasi*. By Pascual J. Soriano and Jesús Molinari

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*Sturnira aratathomasi*  
Peterson and Tamsitt, 1968

Giant Andean Fruit-bat

*Sturnira aratathomasi* Peterson and Tamsitt, 1968. Type locality 2 km S Pance (approximately 20 km SW Cali), Department of Valle del Cauca, Colombia, elevation 1,650 m.

**CONTEXT AND CONTENT.** Order Chiroptera, Suborder Microchiroptera, Family Phyllostomidae, Subfamily Stenoderminae, Genus *Sturnira*, Subgenus *Sturnira* (Davis, 1980; Jones and Carter, 1976; Nowak and Paradiso, 1983). The genus has about 12 recognized living species confined to the tropical and subtropical regions of the New World (Honacki et al., 1982). At present, *S. aratathomasi* is a monotypic species.

**DIAGNOSIS.** Size largest for the genus, both externally and cranially. Within the genus, only *Sturnira magna* is of similar size; the remaining species are much smaller. *S. aratathomasi* (Fig. 1) can be distinguished from *S. magna* by a more depressed and elongated rostrum; a much longer and relatively narrower nasal aperture; and upper inner incisors much more pointed and directed forward, and apically well separated instead of in near contact (Peterson and Tamsitt, 1968).

**GENERAL CHARACTERS.** *Sturnira aratathomasi* is one of the largest of the New World fruit-bats. Body masses in g (range, mean  $\pm 2$  SE) of four males and two females (not including those with advanced pregnancies) from Colombia and Venezuela (Soriano and Molinari, 1984; Thomas and McMurray, 1974) are 46.8 to 53 (49.4  $\pm 3.06$ ) and 50.8 to 54.0 (52.4  $\pm 2.26$ ), respectively. The external and cranial measurements in mm (range, mean  $\pm 2$  SE, and *n*) of all known males and females (Peterson and Tamsitt, 1968; Soriano and Molinari, 1984; Tamsitt et al., 1986; Thomas and McMurray, 1974) are as follows: length of head and body, 89 to 101 (93  $\pm 3.79$ ) 6, 88 to 94 (91.5  $\pm 2.64$ ) 4; length of hind foot, 17 to 21 (18.6  $\pm 1.16$ ) 6, 17 to 20 (18.3  $\pm 1.26$ ) 4; length of ear, 20 to 22 (20.5  $\pm 0.68$ ) 6, 19 to 21 (19.8  $\pm 0.96$ ) 4; length of forearm, 54.8 to 62.0 (58.5  $\pm 1.50$ ) 7, 57.6 to 61.0 (59.3  $\pm 1.26$ ) 5; length of third metacarpal, 54.2 to 60.5 (56.7  $\pm 1.54$ ) 7, 56.0 to 60.7 (57.5  $\pm 1.85$ ) 5; length of first phalanx of digit III, 20.5 to 21.8 (21.1  $\pm 0.35$ ) 6, 21.0 to 22.5 (21.8  $\pm 0.65$ ) 4; length of second phalanx of digit III, 26.3 to 29.0 (27.9  $\pm 0.80$ ) 6, 27.9 to 29.4 (28.6  $\pm 0.66$ ) 4; length of fourth metacarpal, 53.7 to 58.0 (55.6  $\pm 1.27$ ) 7, 54.1 to 58.8 (56.3  $\pm 1.53$ ) 5; length of first phalanx of digit IV, 16.9 to 18.8 (17.5  $\pm 0.65$ ) 6, 17.8 to 19.7 (18.4  $\pm 0.90$ ) 4; length of second phalanx of digit IV, 19.7 to 22.5 (20.4  $\pm 0.87$ ) 6, 19.5 to 21.0 (20.1  $\pm 0.68$ ) 4; length of fifth metacarpal, 56.4 to 60.0 (57.8  $\pm 1.07$ ) 7, 56.9 to 61.0 (58.6  $\pm 1.36$ ) 5; length of first phalanx of digit V, 11.9 to 13.6 (12.5  $\pm 0.55$ ) 6, 12.2 to 14.1 (12.8  $\pm 0.88$ ) 4; length of second phalanx of digit V, 14.1 to 18.2 (15.6  $\pm 1.31$ ) 6, 14.4 to 16.5 (15.1  $\pm 0.95$ ) 4; greatest length of skull, 27.7 to 29.9 (28.8  $\pm 0.65$ ) 7, 27.4 to 29.7 (28.3  $\pm 0.84$ ) 5; condyloincisive length, 26.8 to 27.8 (27.4  $\pm 0.26$ ) 7, 26.8 to 27.7 (27.1  $\pm 0.34$ ) 5; palatal length, 12.5 to 13.2 (12.8  $\pm 0.22$ ) 6, 12.1 to 13.1 (12.5  $\pm 0.48$ ) 4; zygomatic breadth, 16.7 to 17.8 (17.3  $\pm 0.34$ ) 7, 16.8 to 17.5 (17.2  $\pm 0.25$ ) 5; mastoid breadth, 15.0 to 15.4 (15.2  $\pm 0.23$ ) 4, 15.2 to 15.3 (15.3  $\pm 0.10$ ) 2; least interorbital breadth, 7.6 to 8.2 (7.8  $\pm 0.18$ ) 6, 7.5 (7.5  $\pm 0$ ) 4; breadth across postorbital processes, 7.9 to 8.5 (8.1  $\pm 0.19$ ) 6, 7.8 to 8.2 (7.9  $\pm 0.19$ ) 4; breadth of postorbital constriction, 7.0 to 7.3 (7.2  $\pm 0.08$ ) 7, 7.0 to 7.2 (7.2  $\pm 0.08$ ) 5; breadth at M1-M1, 9.7 to 10.4 (10.1  $\pm 0.23$ ) 5, 9.8 to 10.4 (10.1  $\pm 0.20$ ) 5; length of C-M3, 8.2 to 10.1 (8.8  $\pm 0.60$ ) 7, 8.0 to 8.5 (8.3  $\pm 0.19$ ) 5; breadth at C-C, 8.0 to 8.7 (8.3  $\pm 0.24$ ) 5, 8.3 to 8.5 (8.4  $\pm 0.08$ ) 4; mandibular length (condyloincisive), 17.9 to 19.5 (18.4  $\pm 0.41$ ) 7, 18.0 to 18.6

(18.2  $\pm 0.20$ ) 5; length of c-m3, 9.1 to 9.4 (9.2  $\pm 0.10$ ) 6, 9.0 to 9.3 (9.2  $\pm 0.13$ ) 4.

Coloration of the pelage is variable. The male holotype was characterized as dark grayish ventrally with the same tones predominating dorsally (Peterson and Tamsitt, 1968). Grayish tones predominate in other specimens from the Colombian Departments of Cauca and Valle del Cauca, whereas brownish tones predominate in another from Department of Huila (Tamsitt et al., 1986). The specimen from Venezuela reported by Soriano and Molinari (1984) is light golden-brown on the throat and cheeks, grayish brown ventrally (slightly darker on the abdomen than on the chest), and brown dorsally; the head is pale grayish brown on the rostrum and forehead (a faint brown stripe is present along the middle), and brown between ears (darker in the middle area) and between ears and eyes. The overall shading pattern of this specimen seems to agree well with that generalized by Tamsitt et al. (in press) for Colombian specimens, as follows: "The head is Buffy Brown, Snuff Brown, Olive Brown, darker between the ears, Drab, Buffy Brown, Hair Brown, or Fuscous on the nape shading to Snuff Brown, Fuscous, or Fuscous-Black on the rump. The throat is Light Drab, Drab, or Mouse Gray, the chest is Drab or Olive-Brown, and the abdomen is Snuff Brown or Fuscous" (color nomenclature following Ridgway, 1912). According to Peterson and Tamsitt (1968), the holotype has four-banded hairs on the nape and shoulders (a short white basal band, a light gray epibasal band about one-fourth the length, a white subterminal band about half the length, and a grayish brown terminal band about one-fourth the length) and on the rump (a short white basal band present only



FIG. 1. Adult male *Sturnira aratathomasi* (CVULA I-1303) from Monte Zerpa, 4 km NNW Mérida, Mérida state, Venezuela.

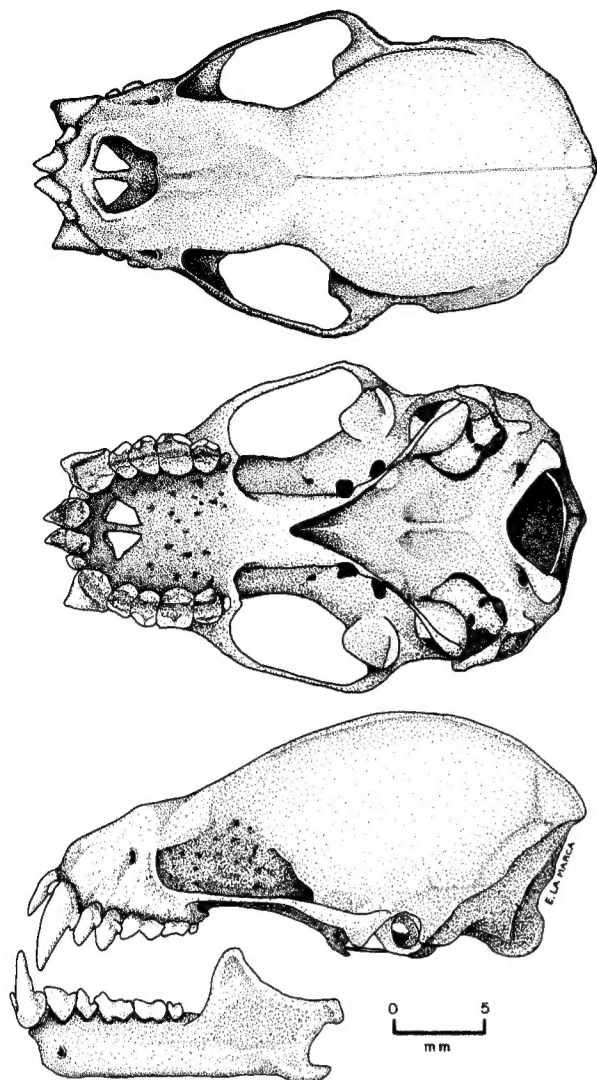


FIG. 2. Dorsal, ventral, and lateral view of cranium, and lateral view of mandible of a male *Sturnira aratathomasi* (CVULA I-1303) from Monte Zerpa, 5 km NNW Mérida, Mérida state, Venezuela.

in posterior part, a brown epibasal band about one-third the length, a gray subterminal band about one-fifth the length, and a dark brown terminal band more than one-third the length). Three-banded hairs are present on the throat (a white basal band about one-fifth the length, a pale gray middle band about two-fifths the length, and a silver terminal band about two-fifths the length), and on the chest and abdomen (a short white basal band, a grayish-brown middle band about half the length, and a pale-silver or silver-brown anteriorly to golden-brown posteriorly terminal band about half the length). By contrast, the Venezuelan specimen has fewer bands of different colors, as follows: nape and shoulders (a brown basal band about one-third the length, a white middle band about half the length, and a brown terminal band about one-fifth the length); rump (a dark brown basal band increasing posteriorly from more than one-third to more than one-half the length, a grayish white middle band decreasing posteriorly from less than half to about one-third the length, and a brown terminal band about one-fifth the length); throat (a grayish basal band less than half the length, and a light golden-brown terminal band more than half the length); chest and abdomen (dark brown basal band less than half the length, grayish brown terminal band more than half the length).

On nape and shoulders, the subterminal bands of the hairs may show through the surface to give a grizzled appearance. Stained shoulder hairs (epaulettes), conspicuous in some other species of *Sturnira*, are not evident. The pelage is soft and woolly. Hair at

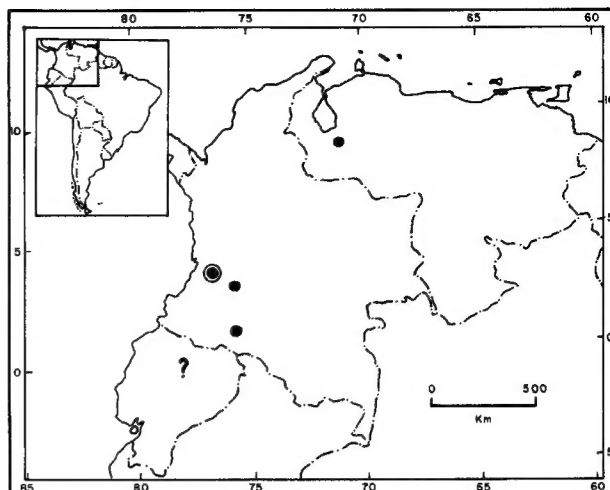


FIG. 3. Map of northwestern South America showing records of occurrence of *Sturnira aratathomasi*; type locality is encircled. The question mark indicates an unknown locality in Ecuador.

nape and shoulders is about 8 mm long; rump hairs are slightly shorter (about 7 mm) anteriorly, but become longer (about 10 mm) at the posterior end; hair at throat and top of head short (about 5 mm) and still shorter on the face, but longer on the chest (about 6 mm) and abdomen (about 8 mm). Like its congeners, *S. aratathomasi* lacks a tail. The short interfemoral membrane is moderately furred with hairs up to 8 mm long. There is no calcar, and the calcaneus is about 2 mm long. The elbow area and adjacent wing membranes are sparsely covered with short (about 5 mm) hairs. Most of the wing membrane is blackish. The noseleaf is about 7 mm high and the tragus about 7.5 mm long (Peterson and Tamsitt, 1968).

The skull (Fig. 2) is distinctive in having a protruding rostrum and upper inner incisors, large occipital condyles, and well-developed sagittal and supraoccipital crests providing support to strong muscles. The lingual cusps (entoconid and metaconid) of the lower molars are well defined. The palates of the two skulls illustrated by Peterson and Tamsitt (1968) and of the skull illustrated here agree in having a number of curious small cavities of irregular shape, size, and distribution. The dental formula is  $i\ 2/2, c\ 1/1, p\ 2/2, m\ 3/3$ , total 32.

**DISTRIBUTION.** Because of the paucity of specimens (12) in collections, the geographic distribution of *S. aratathomasi* cannot be ascertained precisely. The species was described by Peterson and Tamsitt (1968) on the basis of three specimens, two from an unknown locality in Ecuador and one from the type locality (ca.  $3^{\circ}07'N$ ,  $76^{\circ}26'W$ ) in the southern part of the Cordillera Occidental of Colombia. Thomas and McMurray (1974) recorded six additional specimens from near the type locality. Tamsitt et al. (1986) reported two more from the Andes of southern Colombia, one from near Irlanda, Municipality of Páez (Belalcázar), Department of Cauca in Parque Nacional Natural Nevado de Huila (ca.  $2^{\circ}54'N$ ,  $76^{\circ}06'W$ ) in the Cordillera Central, and the other from Parque Nacional Natural Cueva de los Guácharos, Department of Huila ( $1^{\circ}36'N$ ,  $75^{\circ}56'W$ ) in the Cordillera Oriental. The only known specimen from Venezuela (Soriano and Molinari, 1984) is from Monte Zerpa ( $8^{\circ}37'N$ ,  $71^{\circ}09'W$ ), near Mérida, in the Mérida state, more than 800 km from any of the former localities (Fig. 3). The rather large separation between extreme localities, the records in several Cordilleras, and the fact that all known specimens come from montane environments, suggest that the species has a wide distribution in the Andes of tropical South America.

There is no fossil record for the species.

**FORM.** The skeleton of *S. aratathomasi* at the Colección de Vertebrados de la Universidad de Los Andes (CVULA I-1303) shows 7 cervical, 12 thoracic, and 5 lumbar vertebrae. Walton and Walton (1970) listed this sequence as typical for the genus.

The musculature covering the braincase of the same specimen was massive and abruptly incised along the sagittal crest. Its stomach, preserved in formalin, shows a gross morphology in agreement with

the description provided by Forman et al. (1979) for stomachs of *Sturnira lilium* and *S. ludovici*. The description is summarized as follows: the cardiac vestibule is elongate and tapers so that the gastroesophageal junction lies well superior to the gastroduodenal junction; the fundic caecum is saccular, forming a spacious chamber with a rounded apex; the tubular (=pyloric) portion of the stomach is long and narrow.

By comparison with other stenodermines (Smith and Starrett, 1979), members of *Sturnira*, including *S. aratathomasi*, rank low in relative lengths of forearm, second phalanx of digit III, and first phalanx of digit V; and rank high in lengths of third phalanx of digit III, and fifth metacarpal. Likewise, members of the genus rank high in wing loading, but rank medium in values of aspect ratio (overall, wing tip, plagiopatagium) and tip index.

There is no information of the physiology of *S. aratathomasi*.

**ONTOGENY AND REPRODUCTION.** In southern Colombia, a female from Department of Huila taken in March 1978 contained a fetus measuring 9 mm crown-rump, and a male from Department of Cauca taken in September 1980 was a young adult (Tamsitt et al., 1986); another female from Department of Valle del Cauca taken in February 1974 contained a single fetus measuring 34 mm crown-rump. One of two females from the same Department taken in August 1973 was pregnant and aborted a well-haired fetus that measured 43 mm crown-rump, weighed 13.6 g, and had a 23-mm forearm. The testes of three males also taken in August 1973 in Valle del Cauca measured 3, 4, and 6 mm in length (Thomas and McMurray, 1974). The male from Venezuela, a young adult, was taken in January 1981 and had small (about 3 mm) inguinal testes.

**ECOLOGY AND BEHAVIOR.** In Colombia, eight specimens were netted along trails and over streams in dense forest (1,650 and ca. 1,800 m) in Holdridge's (1947) premontane life zone, and one specimen in cloud forest (2,800 m) in the montane life zone (Tamsitt et al., 1986; Thomas and McMurray, 1974). In Venezuela, one specimen was netted at the side of a stream in cloud forest (2,000 m) in the lower montane life zone (Soriano and Molinari, 1984). Judging from the few records, the species is rare. The holotype was the only specimen caught after an effort of 576 net/nights at the type locality, but five specimens were taken at a higher (ca. 1,800 m) locality after an effort of 10 net/nights, suggesting that the species might be common at higher elevations (Thomas and McMurray, 1974). Work performed in Venezuela does not support such a suggestion; only one specimen was caught during more than 350 net/nights in cloud forests (2,000 to 2,600 m) in the Mérida Andes, but resulted in capture of more than 1,700 bats of other species (Handley, 1976; Molinari, 1984; Soriano, 1983).

Other bat species found at the same localities as *S. aratathomasi* are: *Micronycteris megalotis*, *Anoura caudifer*, *A. cultrata*, *A. geoffroyi*, *Carollia brevicauda*, *C. perspicillata*, *Sturnira bidentis*, *S. bogotensis*, *S. erythromis*, *S. lilium*, *S. ludovici*, *Vampyrops aurarius*, *V. umbratus*, *Artibeus cinereus*, *A. lituratus*, *A. (Enchisthenes) hartii*, *Ametrida centurio*, *Sphaeronycteris toxophyllum*, *Myotis oxyotus*, *M. nigricans*, *Eptesicus fuscus*, *E. montosus*, *Histiotus montanus*, *Lasiurus borealis*, and *Tadarida brasiliensis* (Linares, 1973; Molinari, 1984; Soriano, 1983; Soriano and Molinari, 1984; Tamsitt et al., 1986; Thomas and McMurray, 1974).

Thomas and McMurray (1974) reported a yellowish pulp of fruit or material of floral origin in stomachs of three specimens; our specimen yielded a fecal sample consisting of digested fruit pulp and unidentified seeds (Soriano and Molinari, 1984). We were able to keep the latter animal alive for over 2 weeks on a diet of baby fruit preserves and bananas until it was sacrificed for karyotyping. Like other members of the genus, the species may be predominantly frugivorous.

At the time of capture, and occasionally while in captivity, our specimen vocalized unusual calls consisting of loud and relatively low-pitched trilling pulses. The body odor was intense and could be detected more than 2 m away. We speculate that such characteristics might be useful in enhancing communication among individuals, particularly if populations of the species occur at low densities.

There is no information on parasites of the species.

**GENETICS.** Based on one male specimen, Soriano and Molinari (1984) reported that the karyotype of *S. aratathomasi* (Fig. 4) has a diploid number (2n) of 30, and a fundamental number of



FIG. 4. Karyotype of a male *Sturnira aratathomasi* (CVULA I-1303) from Monte Zepa, 4 km NNW Mérida, Mérida state, Venezuela.

56. Autosomes consist of 10 pairs of metacentrics and submetacentrics, and 4 pairs of subtelocentrics. The X chromosome is a subtelocentric, and the Y chromosome is an acrocentric. The karyotype closely resembles those of other members of the genus *Sturnira*, and particularly is similar to that of several species (Baker, 1979) having an acrocentric Y chromosome.

**REMARKS.** The generic name *Sturnira* Gray, 1842 was coined to honor the Starling, a small companion vessel to the Sulphur, the leading ship of an expedition to the coasts of Brazil in which the type of the genus was collected (de la Torre, 1961; Jones and Genoways, 1975). The specific name *aratathomasi* was coined after Andrew Arata and Maurice Thomas, collectors of the holotype.

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#### LITERATURE CITED

- BAKER, R. J. 1979. Karyology. Pp. 107-155, in *Biology of bats of the New World family Phyllostomatidae. Part III* (R. J. Baker, J. K. Jones, Jr., and D. C. Carter, eds.). Spec. Publ. Mus., Texas Tech Univ., 16:1-441.
- DAVIS, W. B. 1980. New *Sturnira* (Chiroptera: Phyllostomidae) from Central and South America, with key to currently recognized species. Occas. Papers Mus., Texas Tech Univ., 70: 1-5.
- DE LA TORRE, L. 1961. The evolution, variation, and systematics of the neotropical bats of the genus *Sturnira*. Unpubl. Ph.D. dissert., Univ. Illinois, Urbana, 146 pp.
- FORMAN, G. L., C. J. PHILLIPS, AND C. S. ROUK. 1979. Alimentary tract. Pp. 205-227, in *Biology of bats of the New World family Phyllostomatidae. Part III* (R. J. Baker, J. K. Jones, Jr., and D. C. Carter, eds.). Spec. Publ. Mus., Texas Tech Univ., 16:1-441.
- HANDLEY, C. O., JR. 1976. Mammals of the Smithsonian Venezuelan project. Brigham Young Univ. Sci. Bull., Biol. Ser., 20: 1-91.
- HOLDRIDGE, L. R. 1947. Determination of world plant formations from simple climatic data. Science, 105:367-368.
- HONACKI, J. H., K. E. KINMAN, AND J. W. KOEPL. 1982. Mammal species of the world: a taxonomic and geographic reference. Allen Press, Inc., and The Assoc. Syst. Coll., Lawrence, Kansas, 694 pp.
- JONES, J. K., JR., AND D. C. CARTER. 1976. Annotated checklist, with keys to subfamilies and genera. Pp. 7-38, in *Biology of bats of the New World family Phyllostomatidae. Part I* (R. J. Baker, J. K. Jones, Jr., and D. C. Carter, eds.). Spec. Publ. Mus., Texas Tech Univ., 10:1-218.
- JONES, J. K., JR., AND H. H. GENOWAYS. 1975. *Sturnira thomasi*. Mamm. Species, 68:1-2.
- LINARES, O. J. 1973. Présence de l'oreillard d'Amérique du Sud dans les Andes Vénézuéliennes (Chiroptères, Vespertilionidae). Mammalia, 37:433-438.
- MOLINARI, J. 1984. Dinámica reproductiva y ecología trófica de *Carollia brevicauda* y otros murciélagos frugívoros. Unpubl. Lic. Biol. thesis, Universidad de los Andes, Mérida, Venezuela, 136 pp.
- NOWAK, R. M., AND J. L. PARADISO. 1983. Walker's mammals

- of the world. The Johns Hopkins Univ. Press, Baltimore, Maryland, 1:1-568.
- PETERSON, R. L., AND J. R. TAMSITT. 1968. A new species of the genus *Sturnira* (family Phyllostomatidae) from northwestern South America. Life Sci. Occas. Papers, Royal Ontario Mus., 12:1-8.
- RIDGWAY, R. 1912. Color standards and color nomenclature. Publ. by the author, Washington, D.C., 44 pp. + 53 pls.
- SMITH, J. D., AND A. STARRETT. 1979. Morphometric analysis of chiropteran wings. Pp. 229-316, in *Biology of bats of the New World family Phyllostomatidae. Part III* (R. J. Baker, J. K. Jones, Jr., and D. C. Carter, eds.). Spec. Publ. Mus., Texas Tech Univ., 16:1-441.
- SORIANO, P. J. 1983. La comunidad de quirópteros de las selvas nubladas en los Andes de Mérida. Patrón reproductivo de los frugívoros y estrategias fenológicas de las plantas. Unpubl. M. S. thesis, Universidad de los Andes, Mérida, Venezuela, 113 pp.
- SORIANO, P. J., AND J. MOLINARI. 1984. Hallazgo de *Sturnira aratathomasi* (Mammalia: Chiroptera) en Venezuela y descripción de su cariotipo. Acta Cient. Venezolana, 35:310-311.
- TAMSITT, J. R., A. CADENA, AND E. VILLARRAGA. 1986. Records of bats (*Sturnira magna* and *Sturnira aratathomasi*) from Colombia. J. Mamm., 67:754-757.
- THOMAS, M. E., AND D. N. McMURRAY. 1974. Observations on *Sturnira aratathomasi* from Colombia. J. Mamm., 55:834-836.
- WALTON, D. W., AND G. M. WALTON. 1970. Post-cranial osteology of bats. Pp. 93-126, in *About bats* (B. H. Slaughter, and D. W. Walton, eds.). Southern Methodist Univ. Press, Dallas, Texas, 339 pp.
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